

To Live with the Sea: Community-Based Management of Marine  
Resources in Southwest Madagascar

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## **Introduction:**

“God intended us to fish, and we will fish until the end,” the elderly Vezo fisherman explained, shrugging his shoulders as if in resignation to an unavoidable truth (Niry). For a people whose history, culture, and economy have revolved around the sea for generations, the idea of preservation is just not palatable, he seemed to be saying. The momentum of tradition, in other words, cannot be stopped. Yet in 23 Vezo fishing villages in the region of Andavadoaka, along the southwest coast of Madagascar, communities have collectively established seasonal and permanent restrictions on critical fishing grounds that together make up an 823 km<sup>2</sup> marine protected area. What prompted these fishermen, one might ask, to voluntarily impose regulations and limit access to the resources they and their ancestors once used freely? Over the course of the past decade, fishermen in Andavadoaka, a village about 45 km south of Morombe, and the surrounding communities, have experienced significant declines in the average yields of octopus and fish. Over-harvesting and both anthropological and climate-induced reef degradation are threatening populations of marine species, and with them, the future livelihood of the communities. In 2003, working together with the London-based NGO Blue Ventures (BV), the inhabitants of Andavadoaka agreed to establish a trial no-take zone (NTZ) beside the near-by island of Nosy Fasy. After seven months of restricted octopus harvesting, fishermen found that populations and average size of the species had greatly increased. News of the success in Andavadoaka prompted many neighboring communities to follow suit, and within a year, eight seasonal reserves for octopus, fish and sea cucumber were established in the region. These communities recognize that the marine resources they depend on require careful management—in other words, if there is no change in the attitude voiced by the old man, “the end” may be much closer than their ancestors could have imagined.

In 2006, an association was established to oversee the growing community-based management efforts and provide a structure to address the concerns of fishermen in the region. The Velondriake association, which means “to live with the sea”, is composed of a committee of elected representatives from each of the participating villages, which are further subdivided into three administrative bodies by geographical region. Wildlife Conservation Society (WCS) joined the Blue Ventures team in providing technical and administrative support. The preservation efforts of the villages are soon to gain the status of Marine Protected Area, which will include seasonally and permanently restricted coral reef, mangrove, sea-grass, and baobab forest habitats, as well as special management areas intended for the development of aquaculture and ecotourism (Harris). The planning and zoning for this extensive marine park was carried out by the representatives of Velondriake themselves.

Despite the many successes, not all community members feel that the preservation efforts of Velondriake have improved fisheries or enhanced their lives in a significant way. Others are simply not prepared to give up traditional practices, and believe that it is their right to fish as they always have. At the same time, the Velondriake committee is working to better serve the community by responding to concerns, and improving and expanding its program and policies. This past November, representatives gathered for a two-day conference in Andavadoaka to address, among other things, the problems and priorities reported in a recent survey conducted in the villages, and to discuss upcoming development projects.

This study will analyze how and to what extent the participating communities are benefiting from the protection and regulation of marine areas, and how local development initiatives can be improved and expanded to better integrate local needs and enhance the quality of life. The first section of this study presents a normative economic evaluation of the preservation efforts on the community. The opportunity costs, in this case the benefits forgone in

not pursuing traditional fishing behaviour, are weighed against the benefits of preservation and the social costs that are avoided as a result. The second section examines the social impacts and implications of preservation in the region. The perspectives and attitudes of village inhabitants towards the actions and objectives of the Velondriake association are analyzed in the context of Vezo society and culture. Drawing on these evaluations, suggestions are made for how the association can improve relations, build trust, and better incorporate the concerns of villagers in community management. The final portion of the study, which investigates the opportunities for further development of the local economy, explores the means by which the association and the participating communities can improve the overall quality of life in the region.

## **Methodology:**

The economic and the social impacts of preservation were assessed using qualitative data collected through a series of interviews in four of the participating villages of the Velondriake association. Members of WCS facilitated an initial meeting with the President of the *Fokontany* in Andavadoaka and the President of the Velondriake association, who then provided a letter of introduction granting official permission to conduct the study in the participating villages. In each village, the President of the *Fokontany* and at least one of the local Velondriake committee representatives were interviewed. The majority of informants were local fishermen, but local merchants, employees of Copefrito, and members of the WCS and BV were also consulted. Fishermen and other adult village inhabitants were chosen randomly, and represent individuals of both sexes, and a range of ages and socio-economic rank. An interpreter translated questions from French to Malagasy, and responses back into French. She was present at the majority of interviews, except for the few occasions in which the informant spoke French. Initially,

interviews were approximately 30 to 45 minutes. However, it was advised by a member of the BV team to limit interviews to 15 minutes, and this recommendation was followed starting on the second day of interviews. In some cases, longer and more in-depth interviews were held with local officials, employees of Copefrito, and members of WCS and BV.

From November 16 through 17, the central committee of the Velondriake held a conference in Andavadoaka, attended by representatives from each of the 23 villages, as well as members of the two associated NGOs. Over the course of these two days, presentations and discussions were held regarding past, present, and future initiatives of the association, as well as results from a recent survey of the population. The translator took notes in French, which she later explained in further detail. During some of the sessions, a member of the Blue Ventures team translated the discussion directly into English.

Daily life in the villages was observed and experienced throughout the field study. The fishing practices and daily routines of the villagers were carefully noted, and stays in the different villages provided a chance to compare and contrast findings.

Limited transportation options obligated a two-day layover in Salary, a Vezo fishing town approximately 85 kilometers to the south of Andavadoaka. Although unanticipated, interviews conducted in Salary proved to be an interesting addition to the study, affording an opportunity to explore the perspective on preservation and resource management in a region where no such initiatives currently exist. As the terminus of the taxi-brousse circuit from Tulear, the studies in Salary also shed light on the effects of Andavadoaka's relative isolation on the local economy.

In addition to limited transportation along the coast, there were a number of unexpected difficulties in the field. Soon after I began to conduct interviews with villagers, it became clear that there was an expectation of payment of some kind in exchange for their time and information. Asking the informant to give their name increased the expectation for payment, as

interactions made clear. This was confirmed by local people, and advised me to stop asking names. Therefore, many informants are referred to with pseudo-names throughout the paper. While distributing gifts to informants may have lessened these difficulties, doing so would have undoubtedly changed the nature of the interaction. Motivated by money, informants may have altered or embellished information, thereby jeopardizing the validity of the data. Small gifts for children were given in some instances, and perhaps a gift of this nature would have been appropriate to bring to the field for all informants as a token of my appreciation.

The most significant obstacle I faced in my field study was the language barrier. While my translator was thorough and accurate in her work, there is inevitably a great deal of nuance, inflection, and tone that is lost in translation. Unable to interact with informants in their native language, I felt I was unable to make my informants feel as comfortable and at ease with me as I would have liked. Even aside from language, my physical appearance as a foreigner undoubtedly affected my interactions with the villagers, and possibly the nature of their responses.

## **Research Findings and Analysis**

### **Give a Little, Get a Little: the Economic Impacts of Preservation**

In a classic normative economic analysis, the benefits of a given activity are weighed against the costs to determine the overall impact on a given individual or group of individuals. In this study, the benefits of community-based resource management and preservation must be weighed against the opportunity costs associated with the behaviours and fishing practices that have been relinquished. The fisheries represent a public good, and so the actions of each individual fisherman have an impact on the resource, and therefore on community welfare as a whole. As such, the cost-benefit evaluation must incorporate social costs, which include private

costs together with the costs borne by others as a result of the actions of an individual, or what is referred to as negative externalities. When decisions are made without considering externalities, the individual will consume or use the public good at a rate that is beyond optimal, depleting the resource for all users. The motivation of the individual fishermen to exploit the resource for his own gain creates a social cost that has contributed to the degradation of the fisheries in the Velondriake region. Particularly over the past ten years, as demand and available buyers of fresh octopus have increased, fishermen have amplified their efforts to harvest this valued commodity (Dany). The implementation of community-based management of the marine resources is a means to reduce these negative externalities and maximize social welfare in the long-run. However, the opportunity costs of complying with the no-take zones and equipment regulations of the Velondriake association are not negligible for the participating communities, and many individuals have incurred significant private costs. Despite these limitations, in consideration of the long-term welfare of the participant communities, the economic impacts of Velondriake's preservation efforts are beneficial.

In the short-run, the octopus reserves clearly increase both the quantity and the quality of the species. At the end of the no-take period, daily catch sores from a pre-reserve average of 0-2 kilos per person to 10-18 kilos (Roger). Individual animals can weigh up to 6 kilos. This heightened catch lasts for 2-3 days, and gradually declines over the course of about one to two weeks, depending on the weather, the number of fishermen present, and the productivity of the zone selected as a reserve. While the immediate results are extreme, they say little about long-term impacts. The initial benefits must be compared to the opportunity costs that are forgone during the previous weeks of limited octopus harvesting. NTZs are generally located in a critical fishing area for octopus, and so yields are significantly reduced during the months of the closure. It is therefore not immediately evident that the increased yields of three days outweigh the total

octopus catch a fisherman forgoes in two months of restricted harvesting. However, recent trends in local octopus populations indicate that in the absence of preservation, their numbers would continue to diminish. Therefore, the outcome of the reserve cannot be compared to a stable, pre-reserve daily average yield, but must be weighed against an alternative situation of declining, or even negligible harvest. Even if populations fall back again soon after opening, the few months of respite give the over-harvested species an opportunity to recover that may be critical to their continued existence in the region. As the fishermen's most lucrative source of income, the total depletion of octopus in the area would certainly be a catastrophe for the local economy. In addition to the short-term benefit of heightened yield, the seasonal restrictions allow this potentially significant future cost to be averted, or at least forestalled. That is not to say that all results of the opening days are short-lived: fishermen report sustained increases in the abundance and size of fish and sea cucumbers, as well as the reappearance of certain species that had previously been rare or virtually depleted. These improvements in yield can persist for weeks and even months after octopus populations have diminished.

Nevertheless, fishermen certainly do incur costs in abiding by the seasonal regulations. During the no-take season, fishermen substitute octopus harvesting with other less-lucrative fishing activities. For men, these alternatives including diving and fishing with both nets and lines, while women primarily harvest sea cucumbers. Fish and sea cucumber, dried and sold to local merchants, earn a lower price than the fresh octopus collected by Murex and Copefrito. Octopus can be harvested from locations outside of the reserve, but this often requires significantly more time and effort on the part of the fisherman, as these sites are generally further away from the village. While wealthier fishermen may be less impacted by the closing, poorer members of the community may not have the equipment or even the pirogue necessary to pursue some of the available alternatives (Eric and George, Velondriake Conference). With their

activities thus limited, many informants, as well as a regional collector of Copefrito, spoke of the economic hardship endured during these no-take periods (Dominique). “When the reserves are closed, our marmites are closed” lamented Gila, an elderly resident Lamboara.

More than just the seasonal restrictions, the fishermen have also agreed to abide by certain regulations on fishing equipment and techniques. Three main restrictions have been established as *Dina*, or local law, and approved by each of the participating villages. Firstly, it is forbidden to use *laro*, a natural substance used to kill fish or other animal, which indiscriminately poisons all marine life over a large area. Secondly, the association has banned the practice of *valibato*, the disruption or destruction of coral. This is a practice frequently employed by women, who drive octopus from their hiding places in the reef by breaking the surrounding coral with long poles. Men also damage or relocate coral heads when they dive to procure octopus living in deeper crevices. Octopus and other marine species are then no longer able to live and reproduce in the degraded coral, and tend to flee to more distant and hospitable locations. The third restriction prohibits the use of small-mesh nets, or *tarikaky*, which capture large quantities of small fish, thereby disrupting the completion of the life-cycle. Like the NTZs, abiding by these regulations comes with certain private costs: fishermen must forfeit techniques that often yield more catch with less effort. The use of *laro*, for example, allows an individual to amass a large number of fish or sea cucumbers for free—as the substance is simply extracted from a tree—and with minimal effort, as the dead animals float to the surface and are easily collected. Many fishermen must buy new equipment in order to comply with the regulations, particularly nets of the allowed mesh-size. While this is a hefty burden for some, it is simply too great of an expenditure for others, leaving those individuals without the equipment necessary for their daily needs.

In consideration these concerns, however, it is essential to keep in mind the reason the

*Dina* were established: destructive fishing methods were accelerating the decline in the populations of octopus and other marine animals, thereby incurring serious long-term social costs. The motivation behind implementing the equipment regulations, like the seasonal regulations of the reserves, is in large part to evade these costs and to improve yields in the future. Moreover, explained Herilala, Director of the Marine and Coastal Program at WCS, the low yield that fishermen complain about is not a matter of available equipment—if populations are allowed to recover, the banned methods are unnecessary to procure sufficient fish and octopus. In addition, some individuals find the new fishing equipment beneficial. Madame Rabebolo of Lamboara, for example, considers the designated nets more efficient than the smaller nets because they catch only the larger fish. The smaller fish are less valued by collectors, she explained, and so have little benefit beyond local consumption.

Many steps have been taken by Velondriake to minimize the costs incurred by fishermen, both in abiding by the new restrictions and in honouring the no-take period. To this end, reserves have been modified in a number of ways to make them less restrictive, depending on the specific concerns of the community. In marine zones that are frequented by fishermen from different neighboring villages, a system of alternating reserves ensures continual access to octopus fisheries. For instance, in the southern portion of the Velondriake region, where fishermen from three villages all harvest octopus in the same cluster of sites, three zones have been designated as reserves. When one is closed, the other two are open, and the restricted zone rotates seasonally. This gives fishermen more access to octopus fisheries throughout the year, while limiting over-harvesting in any one area. In some communities, fishermen have gained the approval of the central committee to fish species other than octopus during the no-take period. In those locations where the periphery of the reserve represents important fishing sites for the community, previously-existing restrictions on these zones have been relaxed. More than just modifications

to the reserves, WCS and Velondriake worked together with Copefrito and Murex to negotiate a price increase for the two initial days after the opening of all reserves. This not only makes the reserves more profitable for the fishermen, but is intended to show gratitude to the fishermen for the sacrifice they have made in the previous weeks (Dominique).

While these and other initiatives are designed to maximize the profitability of participating in Velondriake's program, the community benefits are diminished by two main factors: violation of the *Dina*, and over-fishing during the opening days. Every community reported the existence of what is referred to as "stealing"—or breaching of the *Dina* established by the village. These include fishing illicitly during the no-take period, or continuing to employ banned fishing methods. A number of villages, including Lamboara, have hired a guardian to prevent such activity during the no-take period. According to the *Fokontany* president of Lamboara, M. Rabebolo, as well as a number of other informants in that village, the frequency of these violations rendered the community's second reserve a failure. While it is impossible to discern the number of violators and the affects of such activity on the ultimate productivity of the reserve, these accounts suggest that they can in fact have significant social costs.

For those who have honoured the no-take season, the reward for their sacrifice can be significantly diminished by over-harvesting on the opening days. Anticipating the high yields, fishermen from neighboring villages, as well as boats from as far as Morombe to the north and Ifaty to the south, flood the scene. An estimated 240 pirogues were present on the opening day of the initial NTZ in Andavadoaka (Roger). Such intense harvesting has repercussions for the local octopus population, potentially reversing the progress made during the months of closure. Referred to by some fishermen as a "*blanchit de la terre*", this phenomenon has been identified as a major reason why heightened yields are so short-lived after the opening of the reserve (Ella and Jean, Harris). Furthermore, with so many fishermen present, the benefits of the reserve are

spread thin, diminishing the returns for the members of the community who have borne all of the costs. In response, the local fishermen may lose motivation to preserve in the future. This was acutely felt in Belavenoke, a village in the northern portion of the Velondriake region, where, according to the fishermen Rio, the community has chosen to abstain from the establishment of future reserves (Rio).

Recognizing these critical obstacles, the Velondriake committee has made efforts to prevent local and migrant fishermen from descending upon neighboring reserves, and to discourage violation of the *Dina*. All reserves are closed and opened simultaneously to prevent overcrowding at any one location (Roger)<sup>1</sup>. Penalties for violations of *Dina* have been agreed upon by local communities, and all villagers are encouraged by the central committee to act as enforcers of the local law, and to confront perpetrators from both in and outside of the community. While community enforcement is commendable in theory, in practice, family and friendship ties discourage "tattle-telling" within the village (Velondriake Conference). Furthermore, law-breakers are often migrant fishermen from outside of the jurisdiction of Velondriake. In this case, the community is encouraged to send a letter to the appropriate fishing authorities in Morombe or Tulear if verbal warning proves ineffective. The communities have had little success, however, in repelling outsiders. To this end, the president of Velondriake is working with the authorities in Morombe to broadcast messages over the radio, informing fishermen of the existence of the association, their *Dina*, and the penalties that can be expected if these laws are violated (Roger).

With further efforts to improve the functioning of the reserves and enforcement of the *Dina*, the benefits of preservation will outweigh the social costs in the long-run. While individuals may incur private costs in changing their equipment and forfeiting revenues during

no-take seasons, these are merely short-term in nature. By contrast, the preservation of marine species is an enduring benefit that more than makes up for these losses. Perhaps most telling is the continued and growing voluntary participation of villages in the region. While there are those who disagree, the majority of informants consider the reserves profitable and the *Dina* necessary to secure this success. Clearly, an on-going and in-depth study is necessary to monitor and assess the impacts on the local economy over time as the community-based management efforts continue and expand.

### **Changing Tides: Community Perspective and Social Implications**

In the villages of Velondriake, fishermen have changed more than their nets and modified more than daily routines. Due in large part to the efforts of Velondriake, the community has begun to embrace the idea of preservation, and for some, the notions that logically follow: long-term investment and planning for the future. In the traditional Vezo understanding, the ocean represents an unlimited resource, and to fish from this abundant supply is the almost heavenly-ordained right of the fishermen. Long-term planning is meaningless in this paradigm, as daily needs are always satisfied. The objectives of Velondriake's efforts are understood by many to be merely a temporary restraint on this exploitive behavior, allowing octopus and other species to increase in quantity and size before they are again depleted.

Beyond this simple interpretation, however, a more profound change in attitude is evident in a smaller but still significant proportion of interviews: a shift from short-term to long-term thinking. When discussing the importance of preservation, Francois, a fisherman of Lamboara, made the eloquent analogy of depositing money in a bank account. More than the transient gains of the opening days, he described the reserves as an investment intended to ensure the welfare of

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<sup>1</sup> This excludes reserves on an alternating schedule

future generations. This same concept was repeated by a number of fishermen and fisherwomen, often even by those who were dissatisfied with the personal gains they had made from the reserves.

For the people of the Andavadoaka region, this sentiment reflects a more fundamental shift in cultural perspective regarding marine resources, and the fisherman's relationship with the natural world. This notion was perhaps first shaken by the accelerated decline in marine life, particularly extreme in the past few decades, challenging the idea of an inexhaustible sea. Thinking back to his youth, Thomas of Salary, where preservation has not yet been established, remembered how fishermen would return from the sea with an abundant and diverse catch. Yet now, even with much more advanced fishing equipment at their disposal, many return empty-handed (Thomas). The educational campaigns of Velondriake have helped provide fishermen with an alternative conception of the ocean. In this new paradigm, the sea is a limited resource, and can no longer be depended upon to provide for future generations. Instead, this responsibility lies in the hands of the living.

Perhaps most powerful in affecting this change in perspective are the results that the fishermen have witnessed first-hand. Before the opening of the initial NTZ in Andavadoaka, many fishermen were wary of the notion. In the rural communities, deviations from traditional practices are not easily accepted unless the end results are fully disclosed and the consequences understood. Yet after the success of Andavadoaka, the inhabitants of Belavenoke "did not hesitate" to establish a reserve explained Rio, a fisherman in from that village (Rio). In this case, the phrase "you have to see it to believe it" truly applies: it was only when the reports of 5, 10, 20 kilos of octopus in a day reached the surrounding villages that these communities sought to follow suit, and join the Velondriake association.

Much of Velondriake's success must be credited to the cooperation and commitment of

the individuals in each participating village. It is the community members who choose to establish a reserve, and who collectively make all decisions regarding the timing and location of the NTZ. Most importantly, they bear the responsibility of ensuring the integrity of the preservation efforts by creating and upholding *Dina*. The group-oriented mentality that is a fundamental component of Vezo culture, as well as the larger Malagasy society, has greatly facilitated this type of community-based resource management. Firstly, a structure and format for community-based decision making already exists in the concept of the *fokontany*, the smallest political unit in Madagascar. Assemblies of the inhabitants of the *fokontany* are traditionally called to address local issues, and all present are expected to voice their opinions. It is in these assemblies that the community can create local law, which has been successfully extended to encompass issues surrounding marine preservation. Because laws are created from the bottom-up, instead of imposed by an outside authority, *Dina* possess a legitimacy that state-enforced laws do not. Secondly, respect for authority, highly valued in Vezo culture, lends weight to the environmental-awareness and educational campaigns carried out by the central committee representatives in their respective villages. Local representatives are esteemed by the community just as any locally elected official would be, and many informants give them credit for dissuading the population from using destructive fishing methods, such as *laro* and *valibato*. The third critical element of Vezo culture that facilitates the functioning of the association is that individuals are expected and willing to make personal sacrifices for the general good of the community. Informants typically evaluated the reserves in terms of overall community benefit, rather than personal gain. As Berny of Lamboara explained, while he would prefer not to have reserves in the future, he lends his support to Velondriake because he is aware of the positive results they have brought to others in the village (Berny). “One must support what is good for the community,” echoed Tsiazafo of Tompolo Ve.

The same group mentality that enables the association to be accepted and applied can also undermine the objectives and integrity of community-based management. While any community undertaking requires a degree of personal sacrifice for the welfare of the group, the legitimacy and durability of their activities also depends on the honest input and commitment of every participant. The pressure to comply with community decisions is strong enough that many individuals are compelled to lend their support to the establishment of a local reserve, for example, when they themselves may not be in favor to the initiative, as illustrated by the sentiments of Berny. Time and time again, informants indicated or declared outright that their opinions were irrelevant. Withholding his own thoughts, Leonard of Tompolo Ve offered only that the reserves are the decision of the community, so “one should not oppose the idea.” If individuals do not feel they play an active role in decision-making, and that their opinions do not affect the outcome, commitment to community preservation initiatives and motivation to abide by and enforce *Dina* may be diminished. Moreover, if community members do not express themselves freely, the association cannot obtain the honest feedback and uncensored criticism they need to effectively improve and expand their programs.

The notion that personal opinions are irrelevant also stems from the misconception that the policies of Velondriake are being imposed on the community. Misunderstanding the nature of the community-based association, a number of villagers are under the impression that power lies in the hands of the local representative, the central committee, or even “vazaha” organizations, by which they are likely referring to the NGOs WCS and BV. As a result, the role of the community is deemed to be minimal or non-existent. Others believe that the state is enforcing the NTZs and equipment regulations. This may reflect a misunderstanding of the future Marine Protected Area, which will give the preservation zones established by Velondriake official recognition and legal status, but will leave the community still fully in charge. Those who have misunderstood the

nature of the association as such are not necessarily displeased—according to Hery, a young mother in Lamboara, the value of the reserves must not be doubted, as the state never acts in a way that is not intended to benefit the people. However, misguided conceptions reveal a gap in communication between the central committee and the villagers that can distort the objectives and intentions of the association. In one of the more extreme examples, Raminosoa, an elderly woman of Tompolo Ve, asserted that the local representative together with the central committee in Andavadoaka dictate all decisions regarding the reserves. According to her, the local representative has withheld aid given by the association and intended for the community. Despite the community's discontent, she lamented, the village has no power to re-elect a new representative, as these posts are appointed in Andavadoaka. This account was not relayed by other informants in the Tompolo Ve, and so is assumed to be inaccurate—either a gross misunderstanding or perhaps a rumor. However, as this woman's report illustrates, it is important to dispel the notion that preservation is being imposed, and help villagers understand that they themselves compose the basic unit of the association. The program of the Velondriake, it must be known, depends on their own initiative, and is not in the hands of any outside force.

Moreover, the woman's accusations of a corrupt representative demonstrate that where communication is incomplete, mistrust of the association is quicker to take root. Maintaining good relations with the villagers is often a delicate matter: in the village of Belavenoke, a simple misunderstanding has tarnished public opinion of the association. After organizing an event at the request of the association, the community was offended when in return they received only a t-shirt and a photograph (Charles). The community members believe it was the committee who failed to deliver, while in truth the event was held for the filming of a documentary on the Vezo people, and it was the film crew who bestowed the inadequate gift (Roger). Unfortunately, misunderstanding, and likely rumor as well, has fuelled general hostility towards Velondriake in

this village. This mishap only emphasizes the importance of maintaining clear lines of communication between the association and the community. Moreover, simple gestures can clearly go a long way in shaping the community's attitude, be that for better or worse. Celebratory events, such as the parties held upon the establishment of a new reserve, are a way to show the communities gratitude for their participation, thereby building confidence and trust. This has helped motivate plans for a large party to kick off the official commencement of the MPA, discussed at the November conference in Andavadoaka.

Doubt in the abilities of the association to deliver on promises and address community concerns is perhaps the most common source of tension between the villagers and the committee. As previously discussed, participating in Velondriake's program is perceived by villagers as taking a risk and making a personal sacrifice. As such, communities feel entitled to some sort of compensation in return. If they are expected to follow *Dina*, Julian of Andavadoaka insisted, the association must provide the proper nets the correct equipment to those without. They are prepared to sacrifice for the three months of the NTZ, but "Velondriake must think of the people", and supply food aid during this period of time, explained Helen of Lamboara. In their most recent survey, local representatives collected feedback from villagers, who were given the chance to express their needs and concerns. In discussions with informants, requests for fishing equipment and food aid were the most common demands, among many others. On one hand, the survey gave villagers confidence that the association takes their needs into account. However, while most informants feel that Velondriake listens to the concerns of the population, they expressed little confidence that their demands would be met. If the association wants the community to continue lending their support, warned a fisherman of Belavenoke, they must address the needs and concerns that they voiced (Charles). Whether it is practical or even appropriate for the association to fulfil the given requests, in asking the question, they have

certainly created the expectation of delivery.

Although most informants expressed overall satisfaction with the programs and policies of Velondriake, there is certainly a significant amount of disapproval, stemming from a variety of real and perceived issues. As discussed, violations of *Dina* during closure and over-fishing by neighboring and migrant fishermen have convinced many that preservation just does not pay off. While this dissatisfaction concerns tangible results, for some, disapproval goes deeper: a number of informants indicated that they consider Velondriake's regulations an infringement on the fishermen's traditional practices and habitual fishing domain. "The ocean is our field," explained a fisherman in Lamboara, and to limit access to the sea is equivalent to confiscating the land of a farmer (Berny). More than just the economic repercussions of such an encroachment, restrictions and regulations pose a threat to what some consider the inherent rights of the fishermen. Moreover, deviations from traditional fishing practices are often regarded with suspicion, and blamed for a continued diminution of marine populations. While some informants suggested the new methods were simply unnatural, others insisted that they were contrary to the will of God (Elsa). According to one fisherman, God was responsible for the relative failure of the second reserve because he was not pleased to have all of his marine animals gathered together and killed at once at the opening of the first (Edward).

While these types of deeply-rooted ideas may be difficult to change, continued educational efforts on the part of the association can help fishermen to better understand the objectives of Velondriake. Community debriefings on the progress of the reserves and development projects can help villagers feel more integral in the program, and more proud of the results. Critical to maintaining public support, the association must also continue efforts to increase the utility of the reserves and ensure the enforcement of the *Dina*. And it is through the participation and input of the community members that representatives can identify the problems

and obstacles that exists, and design innovative ideas for improvements. The recent community survey conducted by the local representatives and presented at the conference is an essential step in creating this kind of dialogue. The findings must now be carefully reviewed and considered in the initiatives of the association. Whether community requests are granted or not, they certainly need to receive a response of some sort. Furthermore, periodical and more in-depth surveys of this kind should continue in the future.

### **To Live with the Sea...but Make a Living: The Future of Velondriake**

Without a doubt, the livelihood of the fishermen of the Velondriake region depends on the health of the marine life they harvest. In fact, fishing is the principal source of income for 71% of the population (Harris). While this necessitates the careful management of marine resources, it also points to the more fundamental weaknesses of a local economy without income-generating alternatives. Even with preservation efforts in place, as long as poverty persists and economic activities remain limited, fishermen will be compelled to exploit the sea, and likely at a rate that is unsustainable for the marine ecosystem. Moreover, factors beyond the control of community-management, including population growth, climate change, and seasonal variations may continue to contribute to marine ecosystem degradation. In short, preservation is not enough to ensure the future wellbeing of the population. Accompanying preservation, efforts must be made to seek viable alternative economic activities. Diversifying the economy can help to decrease pressure on fisheries and increase the financial security of the population, particularly in times of low yields or unfavourable fishing conditions. Moreover, overall development of the region in areas of health, education, and transportation can help to ameliorate the overall quality of life.

Recognizing the need for rural development in the area, the Velondriake association has begun to address issues outside the realm of marine resource management. The association has

successfully secured two grants to this end with the assistance of WCS and BV. The Andavadoaka community intends to use the Equator Prize to bring solar and wind-powered electricity to the town<sup>2</sup>. The second grant, furnished by the United Nations Development Program, has made 35,000 USD available to the Velondriake association, pending on acceptance of a viable project proposal. Put forward by WCS and accepted by members of the central committee at the conference in June, this money is to be used to generate electricity as well, but in the form of biogas. This particular project was proposed as a way to address a number of community priorities at once. More than acquiring electricity, these include increasing tourist traffic and growing fruits and vegetables, which are unsuited for the dry climate and littoral soil. Trash collected to fuel the production of biogas will leave the beach cleaner, attracting tourists. The biogas itself will provide electricity, and the waste products will be used to fertilize a botanical garden, where produce can be grown (Herilala).

While this idea seems remarkably well-suited to the needs of the community, it is not clear that it will be accepted and successfully applied in practice. Unfortunately, the processes behind biogas were not fully understood by representatives at the time the project was voted upon. According to the representative of Lamboara, it was only at the most recent Velondriake conference that the details became clear (M. Rabebolo). This was confirmed by, Velondriake representative and President of the *Fokontany* of Tompolo Ve, one of the villages selected as a potential site for the project. The President explained that frankly, he does not foresee villagers readily accepting the notion of “cooking their meals with their neighbors’ waste.” Here again, the concept of “see it to believe it” is applicable, as villagers are unwilling to accept a project that requires a significant change in behaviour before the consequences are clear. Yet unlike the

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This grant proposal was written before the formation of the Velondriake association, and therefore the project involves only that village

NTZs, where positive results quickly dissipated initial reservations, many doubt public opinion will come around to biogas, even with demonstrations and educational efforts. Moreover, the association risks damaging public opinion by pushing a project that clashes with village life and cultural norms, and straining relations between the central committee and an unwilling population. The potential difficulties surrounding this initiative illustrate the importance of choosing projects that not only address community needs, but that corresponds to the lifestyle and attitude of the people. Without a doubt, representatives should have a full understanding of the project details before decisions are made. More importantly, better use must be made of the intimate knowledge local representatives possess regarding community attitudes and social norms.

As part of its development agenda, Velondriake has also begun to take on women's issues. Although husbands and wives typically pool their income, men and women sell their catch to collectors separately. In Vezo society, the woman is traditionally in charge of household budget and makes decisions regarding food, education, and medical expenditures (Herilala). Therefore, more than providing additional cash-flow, increasing the productivity of women may have positive repercussions for child education and wellbeing. These efforts can also help to valorise women's position in an otherwise patriarchal society. While women manage family expenditures, their contribution to household income is more narrowly defined than that of a man. As explained in the most recent conference, octopus harvesting by men at high tide often leaves few animals for the women who follow when the tide is low. Ernestine, a local Velondriake representative in Andavadoaka, expressed her delight that this important women's issue was addressed by the central committee, who even recommended banning of high-tide octopus harvesting altogether. Along with falls in octopus catch, depleted sea cucumber populations represent another issue pertinent to fisherwomen. This is particularly limiting during

the closure of octopus reserves: whereas men can line-fish, dive, and reach fishing zones only accessible by pirogue, women are limited to sea cucumber collection. In response, many communities are establishing sea cucumber reserves. Working in conjunction with BV, the Andavadoaka women's association has created one such sea cucumber reserve, or sea cucumber "farm", in a near-by sea-grass habitat. Aqualab, an aquaculture research organization based in Tulear, has provided the women with young sea cucumbers, and Copefrito has signed an agreement to buy the adults from the participating women when they are harvested ("Blue Ventures...").

Much of a women's day is spent "at home with nothing to do", explained Madame Lydia, the future president of the women's association in Salary," as they waiting for low tide. To this end, Velondriake lends its support to a number of women's associations with the aim of providing women with a supplementary source of income. In Andavadoaka and Lamboara, the participating women make embroidery and baskets to sell to tourists at the Coco Beach hotel in Andavadoaka. According to members, participation is steadily growing, the women find eager buyers amidst the steady and growing trickle of tourists that make the trip up from Tulear (Viviane). Vola of the Blue Ventures team is working to find a way to sell these handicrafts in Antananarivo, where they can earn a higher price (Annie). This expanded market, along with funds to buy the necessary materials, machines and a space to work, could improve the livelihoods of the women involved.

If Velondriake is to continue to take on issues of rural development, namely the diversification of the local economy, the strategies for improvement must be considered within the context of the region. The economy of the Velondriake region is constrained by two main factors, its isolation and its natural climate. The first factor limits the potential for alternative endeavours as well as the existing fish-based economy. A day's drive over a road in various

states of disrepair, or a nearly 200 km journey from Tulear along a coastline with frequently unfavourable winds, the fishermen have extremely limited access to the merchants and markets of larger towns and cities to the north and south. The taxi-brousse from Tulear that formerly served Andavadoaka has modified its service, and now goes only as far as Salary. Those with the means, generally local store-owners, collect dried products from the fishermen and bring them by pirogue to Morombe or Tulear, or collectors from these towns travel along the coast to buy from the villages. As such, fishermen are forced to work through middlemen—perhaps even a series of middlemen—to get their dried seafood products to distributors, exporters, or consumers. Each intermediary takes a cut of the product's final market value, reducing the profit made by the fishermen (Dominique). Moreover, fishermen are frequent victims of exploitation at the hands of collectors who for example, may use intentionally faulty scales, or deduct “gas money” from the prices of the product (Dominique, Ella and Jeanie). Copefrito and Murex are the only consistent collectors of fresh seafood. Although their presence in the region has increased prices, first with the arrival of Copefrito, and then again with the entry of Murex as a competitor, most informants agree that this gain has been concurrent with increases in the price of living, if not completely negated by the fall in average catch (Colonel Robert, Charles).

In addition to restricting the current economy, the isolation of the region renders a number of other potential activities unfeasible, and limits the services and commodities available to the population. As one travels south along the littoral corridor towards Tulear, the state of rural development seems to be a function of distance from the city. Closer to Tulear, Vezo communities supplement fishing with herding livestock, raising mostly cattle and goats. While the Velondriake region could potentially support livestock as well, the animals could not be transported to a market for sale. Zebu and goats are impractical for other reasons as well: purchasing an animal of this sort requires an initial investment of capital that is just not available

to the vast majority of villagers of the Velondriake region. In addition, cattle-raising attracts banditry. Even without significant numbers of livestock, Andavadoaka has been victimized by these brigands in recent years, while neighboring regions where cattle are more abundant have become increasingly destabilized and dangerous (Beatrice).

Agricultural activities are also impractical in the Velondriake region, as the climate and soil is unfavourable to all but a limited range of crops. These are namely sweet potatoes, manioc, and are grown by for local consumption only. Unlike the more fertile regions to the north, rice cultivation and other large-scale agricultural operations are simply out of the question. Again, even if the climate allowed it, transportation of the products to a market would be impractical. The region's isolation affects the flow of goods in both directions: just as villagers cannot get their seafood easily to markets, many basic commodities from outside the region are rarely available to them. By contrast, Salary has a covered-market selling fruits, vegetables, meat, and other products that rarely make it to Andavadoaka, and are practically non-existent in the smaller surrounding villages. Many of the provisions found in Salary are brought overland by taxi-brousse or other vehicles (Tiana, Mirana). Interviews with inhabitants of Salary revealed that the taxi-brousse, although too expensive for most villagers, enables the flow of more than just foodstuffs and commodities. Tiana explained that the taxi-brousse is used to transport sick people, and to visit family who live in other parts of the country, while others indicated it enabled villagers to conduct small business exchanges in the larger towns. In this way, transportation provides opportunities for interactions between people that do not exist to the same extent in Andavadoaka.

In view of these various limitations, what types of activities are viable in Andavadoaka and surrounding villages? Having considered all of the restrictions discussed above, Colonel Robert of the Civil Division of the Malagasy army concludes that aviculture is the most viable

solution. Unlike cows or goats, poultry does not require an insurmountable initial capital investment. More importantly, their market price is a realistic sum for local consumers, and for the seller, provides a fast and practical cash flow to gratify a family's short-term needs. In this way, he argues, aviculture offers the perfect supplementary source of income for the three months of the cyclone season, from December through March, when catch is difficult to find and the weather conditions restrictive. The Colonel is currently raising chickens on a small parcel of land in Salary, both to demonstrate the potential benefits of chicken-raising to the villagers, and with the intention of distributing three animals to each household in the near future. Within a year of this distribution, he insists, these three chickens will have multiplied to 500. In return, each family will give back two of their animals at the end of each year so that the Colonel can continue his farm. Aviculture may indeed be a practical and profitable venture if applied in the Velondriake region. Poultry-raising is certainly not a new concept to the area, and is carried out on a small scale by a number of families. If indeed as feasible as the Colonel insists, aviculture would be expected to be already more widespread. Perhaps many individuals lack the funds or the knowledge to begin, as it was mentioned at the Velondriake conference as one of the projects which communities would like to support to implement. Poultry-raising is clearly an activity whose potential benefits and applicability need to be researched further.

While the region may be lacking in fertile soil and transportation infrastructure, it is certainly rich in natural beauty. More tourism visit Madagascar every year, and the southwest coast is a particularly popular destination. It follows, therefore, that tourism could be developed into a significant component local economy in the Andavadoaka region. A fair number of visitors already visit the area, attracted by the beauty of its beaches and the diversity of the reef's marine life. However, when asked how increased tourist traffic would affect the community, most informants expressed indifference. This is likely because the community gains little or no

benefit from these visitors, who primarily stay and dine at hotels owned by foreigners. As of now, tourists have minimal impact on the local economy, save the handicrafts they may buy at Coco Beach, and the handful of local people who have found employment at the hotels. This is not to say that no local people are making an effort to capitalize on tourism: in Andavadoaka, as evident from discussion of the biogas project at the recent Velondriake conference, the community is interested in attracting visitors by maintaining a beach pristine. A local hotel-owner in the small village of Tompolo Ve, hoping to take advantage of the rising tide of tourists, is expanding and upgrading her accommodations by constructing more upscale bungalows on an adjacent plot of land. While tourism certainly has the potential to infuse the local economy, a number of obstacles stand in the way. For one, villagers are largely unprepared to provide the services demanded by foreign tourists in terms of accommodations, meal preparation, and day trip excursions—services that are available at the more luxury resorts. Moreover, large amounts of capital are needed for the construction and management of a new hotel, capital which is simply not available to local people. Recognizing the economic potential of tourism, BV has been working with the village of Andavadoaka to create a community-managed “ecolodge”. If this project is realized, the whole team of Blue Ventures staff and volunteers would move from their current accommodations at Coco Beach, ensuring a year-round clientele of approximately 40-50 people. All profits from the hotel would be put into a community chest to be used for development projects chosen by the village (Garth). As this future project suggests, with assistance from an outside organization, such as an NGO, communities may be able to harness some of the benefits tourism can afford them.

While they do exist, the region’s alternative economic activities are clearly underdeveloped and limited. As the coastal population grows, the number of fishermen increases year to year, while the marine species they depend on continue to diminish. The way to a better

life for many may be to leave their village and seek employment prospects elsewhere. However, it is clear that the region lacks the educational infrastructure that could afford the next generation the opportunities in larger towns and cities. While Andavadoaka has both private and public primary and secondary schools, parents must send their children to larger towns or Tulear if they are to complete their BAC. Yet children in Andavadoaka are at an advantage compared to most of the other smaller villages in the area. Lamboara, for example, has only one primary school, and as a private institution, many families cannot afford to give their children even a basic formal education (Alfine). In other villages, school buildings remain empty, as inadequate salaries prompt teachers to leave and seek employment elsewhere (Dany).

While the education system is largely in the hands of the state, much can be done within the community to increase the school attendance rate. School is not always a priority in the eyes of parents whose sons and daughters begin accompanying them along the reef at an age as young as 6 or 7 (Colonel Robert, Dominique). Educational campaigns can help to motivate parents and children to stay in school longer. In Ambilobe, a rural commune in the Northwest of Madagascar, a community-based, solar-powered radio station broadcasts these types of messages daily over the radio (Turner). Every day of the week, the radio show is dedicated to a different theme, including health, education, and environment, about which members of the community share related advice and anecdotes. While it is not clear that this type of project would be viable in Andavadoaka, a consistent, community-oriented dialogue of this sort could disperse information and facilitate the exchange of ideas between the villages that is otherwise limited. The Velondriake association, already a cross-roads for community interaction, can act as a catalyst in increasing these lines of communication and spreading awareness with regards to preservation and fishing-related topics, as well as also health, education, and other pertinent issues in the region.

## **Conclusion:**

Old and young men of the village gathered together as Herilala pulled out four pieces of large paper and laid them out in a row. He asked the older fishermen to think back to their youth, and write down on the far left sheet of paper all the species that they used to find on a daily basis. To the far right, the men wrote all the animals currently abundant in the region, and the lists in between showed the intermediates—those fish that were sometimes or rarely caught. When they had finished, the younger men stood looking at the far left list with astonishment, and listened to the elders as they recalled how a fisherman could once fill a pirogue with fish, all in a morning's work. Which direction do you want to go, asked Herilala, towards the right or towards the left? The left, of course, the fishermen responded. That's the direction of biodiversity, the goal of preservation, Herilala explained as he recalled the experience months later, and the men came to it on their own accord. In the effort to conserve natural ecosystems, the interests of the local people are often jeopardized. However, in protecting and managing marine resources, the villages of the Velondriake demonstrate that the goals of conservation and local development can be synonymous. At the November conference in Andavadoaka, the representatives of Velondriake and the members of WCS discussed the waning role of the NGOs, as the association gains the capacity, skills, and the confidence to assume an expanding role in the community. As Herilala's anecdote illustrates, solutions are most effective when they are motivated by the community.

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